

Attorney Docket 960160

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

International Application No.: PCT/DE95/00055  
International Filing Date: 16 January 1995  
For: Process for Finding the Receivability  
of Radio Signals in a Radio System  
By: Fraunhofer-Gesellschaft et al.

86 Sparks Street  
Cambridge, MA 02138-2216

19 July 1996

Hon.  
Commissioner of Patents and Trademarks  
Box PCT  
Washington, DC 20231

Request to Commence U.S. National Phase  
35 U.S.C. 371

Sir:

This is to request commencement of the U.S. National Phase of the above-capture International Application, and in support of thereof, Applicant-Assignees are submitting herewith:

- 1) an English translation of the originally filed specification and 26 claims;
- 2) three sheets of drawings;
- 3) an English translation of 29 claims submitted pursuant to Article 34 PCT;
- 4) an English version of their Request form as amended, including copies of three forms PCT/IB/306 in support of the amended request;
- 5) a Verified Statement Claiming Small Entity Status of Assignee Institute für Rundfunktechnik;
- 6) check No. 3420 totaling \$1,208.00 calculated on the basis of 37 C.F.R. 1.492(a)(3) and 1.492(c); and
- 7) a post card receipt.

The inventors' Declaration and Power of Attorney as well as the Verified Statement Claiming Small Entity

Status of the other Assignee will be filed hereafter.

Please direct all correspondence in connection with the instant application to:

**Karl Hormann, Esq.**  
86 Sparks Street  
Cambridge, MA 02138-2216  
Tel.: (617)-491-8867  
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and notify him of any deficiency in the amount paid herewith, or issue credits for excess payments.

Respectfully submitted,



Karl Hormann  
Registration No.: 26,470

KH:svl  
Enclosures

**Certificate of Express Mail - Express Mail Label No.: EH043231094US**

I hereby certify that this correspondence is being deposited with the United States Postal Service as Express Mail in an envelope addresses to the Hon. Commissioner of Patents and Trademarks, Box PCT, Washington, DC 20231.



Karl Hormann  
Registration No.: 26,470  
Date: 19 July 1996

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY  
STATUS (37 CFR 1.9(f) AND 1.27 (d)) - NONPROFIT ORGANIZATION**

Docket No.  
960160

Serial No.

Filing Date

Patent No.

Issue Date

Applicant/ Gerhaeuser et al.  
Patentee:

Invention:

**Method of Determining the Receptivity of Wireless Signals in a Broadcast System**

I hereby declare that I am an official empowered to act on behalf of the nonprofit organization identified below:

NAME OF ORGANIZATION: Institut fuer Rundfunktechnik GmbH

ADDRESS OF ORGANIZATION: Floriansmuehlstrasse 60
D-80939 Munich
Germany

TYPE OF NONPROFIT ORGANIZATION:

- ☐ University or other Institute of Higher Education
- ☐ Tax Exempt under Internal Revenue Service Code (26 U.S.C. 501(a) and 501(c)(3))
- ☐ Nonprofit Scientific or Educational under Statute of State of The United States of America  
Name of State: \_\_\_\_\_ Citation of Statute: \_\_\_\_\_
- ☒ Would Qualify as Tax Exempt under Internal Revenue Service Code (26 U.S.C. 501(a) and 501(c)(3)) if Located in The United States of America
- ☐ Would Qualify as Nonprofit Scientific or Educational under Statute of State of The United States of America if Located in The United States of America  
Name of State: \_\_\_\_\_ Citation of Statute: \_\_\_\_\_

I hereby declare that the above-identified nonprofit organization qualifies as a nonprofit organization as defined in 37 C.F.R. 1.9(e) for purposes of paying reduced fees to the United States Patent and Trademark Office regarding the invention described in:

- ☒ the specification to be filed herewith.
- ☐ the application identified above.
- ☐ the patent identified above.

I hereby declare that rights under contract or law have been conveyed to and remain with the nonprofit organization with regard to the above identified invention.

If the rights held by the above-identified nonprofit organization are not exclusive, each individual, concern or organization having rights to the invention is listed on the next page and no rights to the invention are held by any person, other than the inventor, who could not qualify as an independent inventor under 37 CFR 1.9(c) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

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Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☐ no such person, concern or organization exists.  
☐ each such person, concern or organization is listed below.

FULL NAME N/A

ADDRESS \_\_\_\_\_

☐ Individual ☐ Small Business Concern ☒ Nonprofit Organization

FULL NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

FULL NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

FULL NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)


I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING: Dr. Henning WilkensTITLE IN ORGANIZATION: Vize Präsident

ADDRESS OF PERSON SIGNING: Institut für Rundfunktechnik GmbH  
Floriansmühlstraße 60  
80939 München

SIGNATURE: x


DATE: 04. Juli 1996

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Amendment Prior to Claims Fee Calculation

Sir:

Prior to commencing the U.S. national phase of the subject international application and with a view to avoiding excess fees otherwise due pursuant to 37 C.F.R. 1.492(d), it is courteously requested that the following amendment be entered:

1.) Cancel originally filed claims 1 - 26 and substitute claims 1 - 29 submitted pursuant to Article 34 PCT.

2.) Amend the claims as follows:

Claim 3, line 1: cancel "one of" and "or 2";

claim 4, line 1: cancel "one of claims 1 to" and substitute --claim-- therefor;

claim 5, line 1: cancel "one of claims 1 to 4" and substitute --claim 1-- therefor;

claim 7, line 1: cancel "one of claims 1 to 6" and substitute --claim 1-- therefor;

claim 8, line 1: cancel "one of claims 1 to" and substitute --claim-- therefor;

claim 9, line 1: cancel "one of claims 1 to" and  
substitute --claim-- therefor;

claim 10, line 1: cancel "one of claims 1 to 9" and  
substitute --claim 1-- therefor;

claim 11, line 1: cancel "one of claims 1 to 10" and  
substitute --claim 1-- therefor;

claim 12, line 1: cancel "one of claims 1 to" and  
substitute --claim-- therefor;

claim 13, line 1: cancel "one of claims 1 to 12" and  
substitute --claim 1-- therefor;

claim 15, line 1: cancel "one of claims 13 or 14"  
and substitute --claim 13-- therefor;

claim 16, line 1: cancel "one of claims 1 to 15" and  
substitute --claim 1-- therefor;

claim 17, line 1: cancel "one of claims 1 to" and  
substitute --claim-- therefor;

claim 18, line 1: cancel "one of claims 1 to" and  
substitute --claim-- therefor;

claim 19, line 1: cancel "one of claims 1 to 18" and  
substitute --claim 16-- therefor;

claim 22, line 1: cancel "one of claims 1 to" and  
substitute --claim-- therefor;

claim 23, line 1: cancel "one of claims 1 to" and  
substitute --claim-- therefor;

claim 24, line 1: cancel "one of claims 1 to" and  
substitute --claim-- therefor;

claim 25, line 2: cancel "one of claims 1 to 24" and  
substitute --claim 1-- therefor;

claim 27, line 1-2: cancel "one of claims 25 to 26"  
and substitute --claim 25-- therefor;


claim 28, line 1-2: cancel "one of claims 25 to 27"  
and substitute --claim 25-- therefor; and

claim 29, line 1-2: cancel "one of claims 25 to 28"

International Application No.: PCT/DE95/00055

and substitute --claim 25-- therefor.

Respectfully submitted,



Karl Hormann

Registration No.: 26,470

Area Code (617)-491-8867

26470 3369/980

DESCRIPTION

METHOD OF DETERMINING THE RECEPTIVITY OF  
WIRELESS SIGNALS IN A BROADCAST SYSTEM

5

Technical Field

The invention relates to a method of determining the receptivity of wireless signals in a broadcast system and to a receiver for performing the operations necessary for the reception.

10 The invention may be especially practiced in a broadcast system, especially in a common frequency system, with the wireless signals embracing, for example, the transmitting stations, program signals and/or program varieties which can be received. For when receiving  
15 radio transmitting stations with mobile receivers, for instance in an automotive vehicle, it is desirable to determine the programs which can be received at any given receiving location. Such programs may include, for instance, traffic reports or information relating to a  
20 traffic conduction system.

State of the Art

Present day analog frequency modulated (FM) transmission methods react sensitively to variations in field strength and to multi-path reception the effects of  
25 which may only partially be reduced, for instance, by elaborate change-over strategies to so-called alternative



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frequencies which are transmitted as components of the radio data signals (RDS signals). Defining a station by means of a mobile receiver has hitherto required elaborate measures. Thus, complex circuit arrangements are required, often even including two receiving sections, reference transmitters and/or lists of alternative frequencies stored in the receiver. The latter is required for switching, wherever possible without delay and inaudibly, to alternative frequencies in case a program tuned in on a mother station can either not be received at all or poorly only. To obtain, depending upon the actual receiving location, data about receivable programs is possible to a limited extent only with existing systems, such as, for example, the aforementioned RDS. Moreover, the scanning operations for finding receivable transmitters and their identification require a relatively long time.

A method utilizing the radio data signals of at least three stationary transmitters for passive evaluation to define a location with a mobile wireless receiver is known from German patent specification 4,107,116. The publication states that the method offers the possibility of linking the defined position coordinates of the mobile wireless receiver with route-specific and/or geographic identification signals of traffic reports transmitted via the RDS signal over the traffic message channel. In this manner, only those reports which are significant to the instantaneous location are selected from the transmitted reports; all the others are faded out. The disadvantage of such a system is that the operator has to preselect the given program variety, such as, in the present example, the traffic report, so that prior to his selection he does not know whether he will receive anything at all, or what it will be. Hence, it will take some time after one or

more searching operations until the operator will actually receive the desired information.

To achieve a qualitatively excellent wireless audio transmission corresponding to the quality standard offered by digital storage media (for example DAT), a standard was developed for a terrestrial digital transmission method, known as DAB (digital audio broadcasting). One of the essential characteristics of the DAB method is the common frequency operation of the transmitters employed for a receiving area, with all of the transmitters being connected in a frequency and phase locked relationship and the modulation contents of the individual carriers being identical for all transmitters. From German Patent Specification 4,223,194 it is known that a receiver suitable for DAB may simultaneously be utilized for defining a location, so that no additional receivers are required. Additional transmitters are also not required.

Moreover, German Patent Specification 4,222,877 describes how regionally or locally different data may be transmitted in a DAB network with technical means, without interfering with the common frequency transmission of locally identical data. The transmission of regionally different data is specifically carried out by additional transmission from the transmission station of individual carrier frequencies which are preferably transmitted in a time slot of a transmission window which is also utilized for synchronizing the receiver. The receiver, for performing receiving operations, is provided with a memory and an indicator, additional data being stored in the memory by means of a data record associated with each transmission station. They may either be displayed on the indicator, or they should enable the operator of the receiver to improve the

quality of the reception, for instance, by changing the receiving parameters. The specification only discloses how regionally limited data can be transmitted with technical means within a DAB network.

5

### Description of the Invention

Proceeding from the state of the art described supra, it is the task of the invention to provide a method of and a receiver for determining the receptivity of wireless signals in a broadcast system such that any  
10 wireless signal desired by an operator may be quickly and reliably tuned in on his receiver or receiving device at any given location within a receiving area.

The task is accomplished by the elements of the characterizing portion of claim 1. Preferred  
15 improvements are set forth in the subclaims.

The invention provides for a method and for a receiver for carrying out this method, by means of which data regarding receivable wireless signals may be determined, and presented for selection by an operator,  
20 at any location within a receiving area served by one or more transmitters of a broadcasting system.

The wireless signal thereafter selected by the operator is tuned in directly on his receiver and is thus available for further uses at the actual receiving  
25 location, for instance for actualizing and/or supplementing data stored in the receiver proper or in a data carrier (for instance a chip card) which either is connected with the receiver or has to be connected with the receiver for data actualization. In one embodiment  
30 of the invention as applied to a broadcast system, the further utilization of the selected wireless signal such

as, for example, a program, consists primarily in making the program tuned into the receiver audible to the operator through loudspeakers. Another kind of use resides in the presentation of visual information, such as maps, on a video monitor.

The invention serves especially for determining the receptivity of transmitters, program signals and/or of program varieties and other wireless signals, as the case may be, in a broadcast system. Preferably, the transmitters will be operating in a common frequency mode, and they may be stationed on earth or extra-terrestrially, as on satellites, for instance. Aside from audio programs, the program signals may selectively include data programs also. Program variety connotes kinds of programs such as popular music, sports or classical music which depend upon the broadcast station or chain of broadcast stations (for instance Bayern 3 \*) by which they are transmitted. Known methods, for instance from radio technology or satellite navigation systems are utilized for exact or approximate determinations of the receiving location. A method of defining a location suitable for a DAB broadcast system which uses a phase comparison hyperbola method, has been described in German Patent Specification 4,223,194.

It is of advantage to determine especially the reliably receivable transmitters, program signals and/or program varieties at a given location within the receiving area. They are readily determinable owing to the transmitting power of the individual transmitters and their locations, whereas the overrange reception, for instance, may uncontrollably change because of different weather conditions or because of sun spot activity.

Broadcast stations are located, and their

transmitting power is determined, such that the receiving area may preferably be divided into several partial areas

\*)Radio station in Germany (Translator's note)

so that the same reliably receivable transmitters,

5 program signals and/or program varieties may be received at any location within each partial area. Thus, for each partial area a single list of data relating to the reliably receivable transmitters, program signals and/or program varieties will suffice. These local lists, 10 hereinafter sometimes referred to as "B-lists", are transmitted by the stations, preferably by arranging all local B-lists in succession. The B-list sequence thus created is broadcast by all stations. In a special embodiment of the invention, the B-lists are stored in 15 the receiver, and the stations transmit only data concerning changes to be made in the B-lists stored in the receiver. Such changes may be relate to program changes at relatively short notice. Except for transmission errors in the transmitted actualizing data 20 for the B-lists, the storage of the B-lists will be error free, thus resulting in a considerably greater reliability for the operator.

In addition to the B-lists, an A list will be used which contains the identification signals of all trans- 25 mitters, program signals and/or program varieties which may in principle be received in the receiving area. This list A is transmitted by the stations. In a further embodiment of the invention, the list A is stored in the receiver, preferably in an external mass storage or bulk 30 memory. "In principle received" means in particular that the list A is set up with free spaces for stations which are existing but which are not transmitting or for stations which are in the planning stage only. If a new transmitter is added to the transmission network, or if 35 an old transmitter is turned off, the list A will be

actualized correspondingly. Hence, in the previously mentioned embodiment of a list A stored in a receiver only these changes need be transmitted. In list A, changes will occur rather infrequently, whereas in the B-  
5 lists program changes of short notice will be reflected.

The B-list valid for a given receiving location will be selected from the B-lists, and more particularly from the B-list sequence, on the basis of the defined location coordinates of the receiving location or on the basis of  
10 location data relating to the associated partial area. On the basis of the local B-list, the appurtenant identification signals of the transmitter, program signals and/or program varieties are selected from the A-list and are made available for the user's selection by a  
15 visual or voice signal. The user is thus apprized of the transmitters, program signals and/or program varieties receivable at his actual receiving location, and may, if he wishes, select a particular transmitter and/or a particular program and/or a particular kind of program.  
20 Following selection by the user, the desired item is directly tuned into his receiver.

In a broadcasting system, such as the DAB system, in which several frequency blocks of a predetermined bandwidth are frequency transmitted in a side-by-side  
25 manner, and in which a receiver is probably capable of receiving only one such frequency block at any given time, care must be taken, that such receiver does not only recognize the program contents of its frequency block but also the program contents of other, adjacent  
30 frequency blocks. This is accomplished in the local B-lists by the use of data relating to receivable transmitters, program signals and/or program varieties which may also be received in other frequency ranges, channels or frequency blocks. This ensures that the user

is given an indication of the transmitters, program signals and/or program varieties receivable for his selection at his receiving location. It is of particular advantage that it is not necessary to detune the receiver  
5 and that an indication of receivable transmitters, program signals and/or program varieties is given at a shorter time. Conversely, more programs may be offered to the user at the same indication interval.

In a particular embodiment of the invention, it is  
10 not only the B-list valid at a given receiving location which is selected at this actual location and is stored in the receiver, but also the B-lists for the adjoining partial areas. Upon changing the receiving location, the same situation is created on the basis of the stored B-  
15 lists of the immediately adjoining partial areas. The B-lists of those partial areas which are no longer adjoining the new receiving location are erased from the memory, and the B-lists of the newly added partial areas are added to the memory. Storing of the B-lists of  
20 adjoining partial areas is advantageous that by utilizing the directional data of the changing receiving location the data relating to receivable transmitters, program signals and/or program varieties may quickly and reliably be put at the disposal of the user, for his selection,  
25 when changing into an adjoining partial area. The user will either generally or upon request be given an indication whether the program he is currently receiving can still be received, or not, after changing to an adjoining partial area. He may then make a new selection  
30 or he may arrange, by means of the priority selection of a program variety at least to receive a program of the kind selected by him.

Where the receiving area is divided into partial areas in a pattern approximating a chessboard, there will

be eight adjoining areas for each partial area. Hence,  
when moving the receiving location diagonally in the  
square of a partial area, five B-lists will always have  
to be erased as well as added. When changing the  
5 receiving location in a direction parallel to the limits  
of the partial areas, only three B-lists times two need  
be changed which can, however, be accomplished quickly.

B-lists preferably made up of sequences of  
(program/variety) numbers, each one represented by a 16-  
10 bit-address, are of further advantage, for they can  
quickly be read into a receiver, and because of their low  
memory space requirements they permit the use of random  
access memories (RAM's) for storing local B-lists and/or  
B-lists of adjoining partial areas.

15 By the use of local B-lists and their linking with  
the list A, the invention provides for utilizing advance  
information thereby more quickly indicating for a user's  
choice the transmitters, program signals and/or program  
varieties which can be received and, furthermore,  
20 ensuring him of a high degree of certainty as to the  
reception of a selected program or program variety. This  
is evident from the fact that the memory requirements for  
several B-lists stay within limits so that not only the  
actual B-list but also the B-lists of the adjoining  
25 partial areas may be stored in commercially available  
memory components.

The invention will hereinafter be described in  
greater detail on the basis of embodiments, with  
reference to the drawings, in which:

30 Fig. 1 is an excerpt of a map;

Fig. 2 are excerpts of a list A and of a sequence of B-



lists with correlated numbers;

Fig. 3 is a formatization of a B-list;

Fig. 4 is a receiver.

Fig. 1 depicts an excerpt of a map into which the  
5 borders of a broadcast area D have been entered in their  
entirety, and the borders of adjoining broadcast areas  
A<sub>I</sub>, B<sub>I</sub>, C<sub>I</sub>, A<sub>II</sub>, and B<sub>II</sub> have been partially entered.  
Individual transmitters have been shown in Fig. 1 by  
subscript numbers on the right next to the symbol of the  
10 broadcast area. For differentiation, local and regional  
transmitters have been identified by index L. The entire  
surface of each of the broadcast areas is served by one  
or more common frequency networks. The areas A<sub>I</sub> and B<sub>I</sub>  
as well as B<sub>I</sub> and B<sub>II</sub> are spatially sufficiently divided  
15 that identical transmission frequencies may be allotted  
to areas A<sub>I</sub> and A<sub>II</sub> as well as B<sub>I</sub> and B<sub>II</sub>, without any  
possibility of mutual disturbances. At low transmitting  
power, the frequencies defined for local and regional  
transmitters in one broadcasting area preferably coincide  
20 with the frequencies of the adjoining areas; where the  
transmitting powers are too great, adjoining areas will  
employ different frequencies.

The data transmitted as list A in the common  
frequency network of broadcast area D contain program  
25 data PI and program variety PS, similar to an RDS system,  
of all transmitters which can be received. This list  
also contains the program identification signals of those  
programs which are transmitted from adjoining areas at  
the borders of a broadcast area and which can be  
30 received, as well as the identification signals of all  
receivable local and regional transmitters. Furthermore,  
data relating to receivable transmitters, program signals

and/or program varieties which are receivable in other frequency ranges, channels or frequency blocks are transmitted in list A. All identification signals of list A are identified by consecutive natural numbers (Fig. 2). In a common frequency network the program identification signals valid for the environment of individual transmitters are transmitted in individual lists which consist only of number sequences of the numbers of list A. Fig. 2 depicts the beginning of list A, starting with program varieties  $PS_1$ ,  $PS_2$ , and so on, of station  $D_1$  in broadcast area D. Following this are the program varieties of the local transmitters and the program identification signals of the remaining stations. Starting with program variety  $PS_1$  of station  $D_1$  natural numbers beginning with one are allotted in ascending order to the program identification signals. Below the excerpt of list A there is shown in Fig. 2 the beginning of the B-list sequence represented by symbols. At the beginning, there is shown the identification signal of a transmitter, here  $D_1$  followed by the numbers of those program identification signals of the A list the programs of which can be received at locations in the vicinity of transmitter  $D_1$ . This is followed in the sequence of B-lists by an analogous enumeration for transmitter  $D_2$  and so on.

As shown in Fig. 3, a local list B is made up of a defined number of bytes. After a start command in byte I, there follows in byte II the data for which transmitter X of the common frequency network the following list of numbers of program identification signals is valid. In bytes III through n the numbers of the program identification signals valid for transmitter X are listed in accordance with their correlation to list A. This is followed by the end of the identification signal of a B-list in byte n+1. By sequentially

arranging such formatted B-lists there is created a B-list sequence of which Fig. 3 depicts only the end identification signal  $n+1$  of B-list  $B_Y$  of transmitter Y, the entire B-list  $B_X$  of transmitter X and the first byte  
5 I of B-list  $B_Z$  of transmitter Z.

By means of the transmitter location identification signal of the nearest transmitter of the common frequency network which is receivable at the receiving location the receiver initially selects the B-list which applies to  
10 the receiving location. On the basis of this B-list the program identification signals valid for the actual receiving location are selected from list A and kept in a memory for the emission of an indication.

Only the programs of the common frequency network D  
15 can be received at locations near transmitter  $D_5$ . The programs of transmission networks D,  $A_I$  and  $B_I$  can be received at a receiving location near transmitter  $D_1$ . The programs of the transmission network D as well as of the local transmitters  $DL_{11}$ ,  $DL_{12}$ ,  $DL_{13}$  and  $DL_{14}$  can be received  
20 at receiving locations near transmitter  $D_8$ . The programs of transmission networks D,  $B_I$ ,  $A_{II}$ , as well as the programs of local transmitters  $BL_1$  and  $BL_2$  are receivable at a receiving station near transmitter  $D_{10}$ . The programs of the transmission networks D and  $B_{II}$  can be received  
25 near transmitter  $D_{16}$ .

The operating mode of a receiver for practicing a first embodiment of the method in accordance with the invention will hereafter be explained on the basis of Fig. 4.

30 The receiver is provided with a first receiving component (1) for receiving und decoding of the transmitter location identification signal. In stage (2)

connected to receiving component (1) the identification signal of the transmitter location of the currently received transmitter is evaluated. This identification signal is fed to a memory (3) to be stored therein.

5        A further receiving component (4) of the receiver receives data by way of list B and list A. In stage (5) which is connected to the receiving component (4), the data contained in the B-lists are specially selected. In the selection stage (6) the B-list valid for the actual  
10 receiving location is selected on the basis of the available transmitter location identification signal or location data and is stored in a further stage (7).

Those data received by the receiving component (4) which contain the program identification signals and  
15 their numbering (list A) are selected in stage (8). The program identification signals valid for the receiving location are selected from the read-in list A on the basis of the data relating to the B-list valid for the actual receiving location and contained in memory (7),  
20 and stored in memory (10). From this memory the program identification signals are fed to an indicator where they are available to be called up by a user or listener. The indicator may be a video display or a voice emitter.

The display on a monitor or the voice emission of  
25 the programs receivable at the receiving location is initiated by an input from the user in stage (12), as by pushing a key "call up". The receivable programs will then appear on the monitor in succession with a sufficient dwell time (for instance 3 seconds). Should  
30 the listener wish to change to one of the indicated programs, he may prompt the change in the receiver to a currently indicated program by pressing a "new selection" key. The program identification signal which appears in

the indicator is transferred to a further stage (13). By pressing the key "new selection" the (selected) program identification signal is transferred to the receiver in a receiving component (14) which tunes in the corresponding program.

At a change in the program and/or a change of the transmitter location identification signal or of the receiving location the entire process described above is released again, and the contents of every memory are replaced.

In a second embodiment of a receiver for practicing the method in accordance with the invention selection of a predetermined program variety leads to an indication of only those programs in the display which fall under the selected variety.

In a further embodiment another generally known and available method for determining the actual location or receiving location, such as, for instance, a method satellite navigation or other traffic navigation systems, is used instead of the location identification signal of the received transmitter. The coordinates of the actual receiving location determined thereby are stored in memory (3) and are used for the selection of the B-list applicable to the actual receiving location.

4434

English Translation of the International  
Preliminary Examination Report dated 28 March 1996

**Patent Claims**

1. Method of determining and furnishing wireless signals and data of wireless signals receivable at the actual receiving location using location data in a broadcast system in which receiving locations in a receiving area are served by one or more transmitters, **characterized by the fact** that for determining data about wireless signals receivable at the actual receiving location first lists (A) are used which contain data about wireless signals which are in principle receivable in a receiving area served by one or more transmitters whereby in the lists (A) one or more indicia are allotted to the data about the wireless signals transmitted by each transmitter, and that for the selection from the first lists (A) of all wireless signals and data about these wireless signals second local lists (B) are used which contain for one partial area each of the receiving areas the indicia allotted to the data about the wireless signals receivable in the given partial area, and that on the basis of the furnished data a wireless signal selected by the user is furnished directly from all wireless signals receivable at the actual receiving location.

2. The method in accordance with claim 1, **characterized by the fact** that the location coordinates of the actual receiving location are determined and used as the location data.

3. The method in accordance with one of claim 1 or 2,  
**characterized by the fact**  
that the data are determined on the basis of wireless  
signals which are reliably receivable at the actual  
receiving location.

4. The method in accordance with one of claims 1 to 3,  
**characterized by the fact**  
that the data about which wireless signals are in  
principle receivable in a receiving area served by one or  
more transmitters are transmitted by the transmitters.

5. The method in accordance with one of claims 1 to 4,  
**characterized by the fact**  
that the data about which wireless signals are in  
principle receivable in a receiving area served by one or  
more transmitters is stored in the receiver.

6. The method in accordance with claim 5,  
**characterized by the fact**  
that upon changes of the wireless signals in principle  
receivable in a receiving area served by one or more  
transmitters only those of the data stored in the  
receiver are exchanged which are effected by the changes.

7. The method in accordance with one of claims 1 to 6,  
**characterized by the fact**  
that the data about which wireless signals of the lists  
(A) are receivable in dependence of the actual receiving  
location (lists B) are transmitted by the transmitters.

8. The method in accordance with one of claims 1 to 7,  
**characterized by the fact**  
that the data about which wireless signals of the lists  
(A) are receivable in dependence of the actual receiving  
location (lists B) are stored in the receiver.

9. The method in accordance with one of claims 1 to 8, **characterized by the fact** that at a change in the receiving location only the data valid at the actual receiving location are changed in the memory which differ from the data which was valid at the next preceding receiving station.

10. The method in accordance with one of claims 1 to 9, **characterized by the fact** that the data (lists A) about which wireless signals are in principle receivable in a receiving area served by one or more transmitters are actualized once in a transmission cycle, whereas data (lists B) about which wireless signals are receivable in dependence of any actual receiving location are actualized more often.

11. The method in accordance with one of claims 1 to 10, **characterized by the fact** that the local lists (B) which for any partial area of the receiving area contain the indicia allotted to the data about the wireless signals receivable in the given partial area are compiled into a single list.

12. The method in accordance with one of claims 1 to 11, **characterized by the fact** that the local list (B) valid for the actual receiving location is determined with local data about the actual receiving location from the local lists (B) and that the data about all wireless signals receivable at the actual receiving location is selected on the basis thereof from the lists (A).

13. The method in accordance with one of claims 1 to 12, **characterized by the fact** that individual numbers are allotted as indicia to the data about which wireless signal are in principle receivable in a receiving area served by one or more



transmitters (lists A) and that the local lists are compiled from sequences of these numbers.

14. The method in accordance with claim 13,

**characterized by the fact**

that the data about which wireless signals are in principle receivable in a receiving area served by one or more transmitters (lists A) are transmitted by the transmitters and/or are stored in the receiver, together with the allotted numbers.

15. The method in accordance one of claims 13 or 14,

**characterized by the fact**

that the data about which wireless signals of the list (A) are receivable in dependance of the actual receiving location (lists B) are transmitted by the transmitters and/or stored in the receiver as sequences of numbers.

16. The method in accordance with one of claims 1 to 15,

**characterized by the fact**

that the data about which wireless signals are in principle receivable in a receiving area served by one or more transmitters (lists A) as well as the data which wireless signals of lists (A) are receivable in dependence of the actual receiving location (lists B), do not only contain the currently received frequency band or the currently received channel or frequency block but also other frequency bands, channels or frequency blocks.

17. The method in accordance with one of claims 1 to 16,

**characterized by the fact**

that identification signals about transmitter locations transmitted by the transmitters and/or phase comparison hyperbola methods are used for at least approximatingly determining the actual receiving location.

18. The method in accordance with one of claims 1 to 17,

**characterized by the fact**

that a method in accordance with satellite navigation is used for determining the actual receiving location.

19. The method in accordance with one of claims 1 to 18,

**characterized by the fact**

that at every location within a partial area allotted to a local list (B) of the receiving area served by one or more transmitters the same receivable wireless signals are receivable.

20. The method in accordance with claim 19,

**characterized by the fact**

that for an actual receiving location in a partial area the data about wireless signals (lists B) which are receivable in this partial area or in the adjoining areas are transmitted by the transmitters and/or stored in the receiver at the actual receiving location.

21. The method in accordance with claim 20,

**characterized by the fact**

that at a change to a receiving location in an adjoining partial area the data about wireless signals (lists B) receivable in the newly added partial areas are stored in the memory and the data about receivable wireless signals in the partial areas which relative to the new receiving location are no longer adjoining areas are erased.

22. The method in accordance with one of claims 1 to 21,

**characterized by the fact**

that for a faster exchange of the data in the memory data regarding the direction of travel is consulted as advance data even before arriving at the new receiving location.

23. The method in accordance with one of claims 1 to 22,

**characterized by the fact**

that in a broadcast system, particularly in a common

frequency system, the wireless signals include at least the receivable program signals and/or program varieties and/or transmitters.

24. The method in accordance with one of claims 1 to 23, **characterized by the fact** that the data about the wireless signals in principle receivable in a receiving area served by one or more transmitters are compiled and utilized in a single list (A).

25. Receiver for practicing the method in accordance with one of claims 1 to 24, **characterized by the fact** that the receiver comprises a circuit unit for the automatic and/or user controlled determination of local data about the actual receiving location and that, furthermore, in the receiver there is provided a memory in which for the actual receiving location in a partial area the data about all wireless signals (lists B) which are receivable at least in this partial area are storable, and that the receiver furthermore comprises a control unit, whereby, on the basis of local data and the data (lists B), the control unit selects from the first memory all data valid for the actual receiving location about receivable wireless signals from the lists (A), and that these data from the lists (A) valid for the actual receiving area are put at the disposal of the user for his selection by a indicator unit which is part of the receiver.

26. The receiver in accordance with claim 25, **characterized by the fact** that the control unit determines the local list (B) valid for the actual receiving location on the basis of the local data from the lists (B) and selects the data about receivable wireless signals valid for the actual

receiving location from the lists (A) on the basis of this valid local list (B).

27. The receiver in accordance with one of claims 25 to 26,

**characterized by the fact**

the memory is a random access memory (RAM).

28. The receiver in accordance with one of claims 25 to 27,

**characterized by the fact**

that the receiver comprises an antenna arrangement and/or a further memory, to receive the data about wireless signals which are in principle receivable (lists A) in a receiving area served by one or more transmitters or to read them into a further memory, especially a bulk memory.

29. The receiver in accordance with one of claims 25 to 28,

**characterized by the fact**

the indicator unit is controllable by the user and comprises an optical indicator and/or an acoustic message.

**ABSTRACT**

5 The invention describes a method of determining the  
receptivity of wireless signals in a broadcast system and  
a receiver for performing the receiving operations.

10 The invention is of particular importance to a broadcast  
system, above all a common frequency system. For when  
receiving radio stations with mobile receivers, for  
instance in an automotive vehicle, the user may desire  
quickly to be tuned to a program receivable at the given  
15 receiving location and desired by him. With present-day  
systems, such as the radio data signal this possibility  
is severely limited, for instance to traffic reports. By  
contrast, the invention makes it possible to determine,  
and render visible to the user on an indicator for his  
20 selection, the programs and/or program varieties which  
are receivable at any location or at least smaller  
partial areas of a receiving area served by radio  
stations.

20 The user enjoys the advantage that the receivable  
programs are indicated to him and that upon selection of  
a desired program it will be tuned in. The invention  
avoids time-consuming search scans for finding a desired  
program.

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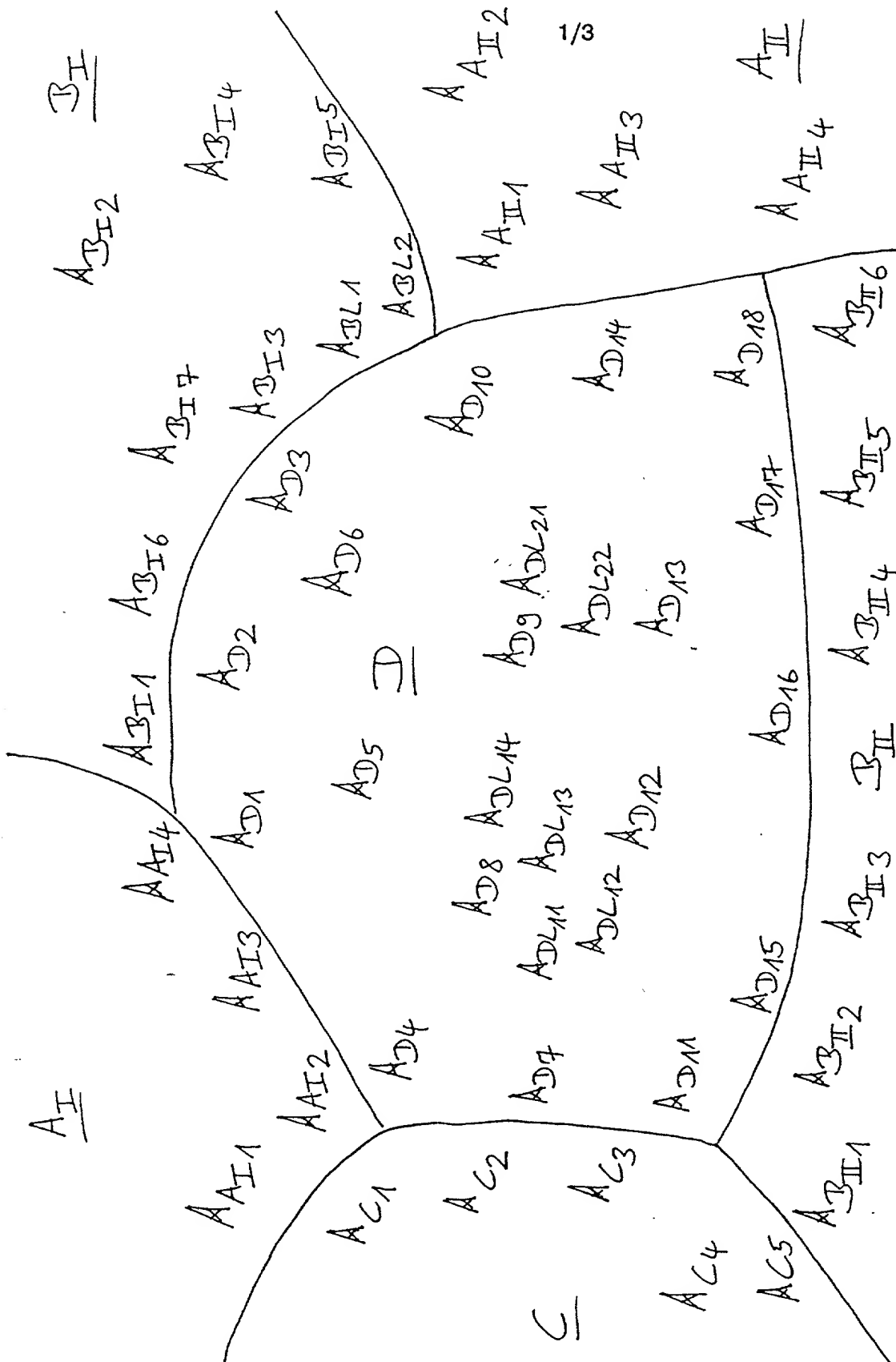


Fig. 1

ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED

08/676355

Liste A:

PS <sub>1</sub> , PS <sub>2</sub> , PS <sub>3</sub> , PS <sub>4</sub> , PS <sub>5</sub> , PS <sub>6</sub>	PS <sub>L1</sub> , PS <sub>L2</sub> , PS <sub>L3</sub> , ...	...
1, 2, 3, 4, 5, 6,	7, 8, 9, ...	...

Liste B:

D <sub>1</sub> : 1, 2, 3, 4, 5, 6, 34, 35, ..., 73	D <sub>2</sub> : 1, 2, 3, 4, 5, ..., 17, 18, 25	...
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Fig. 2

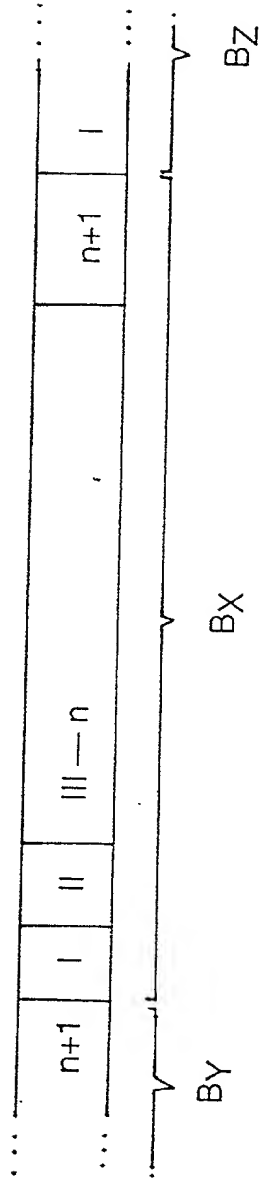


Fig. 3

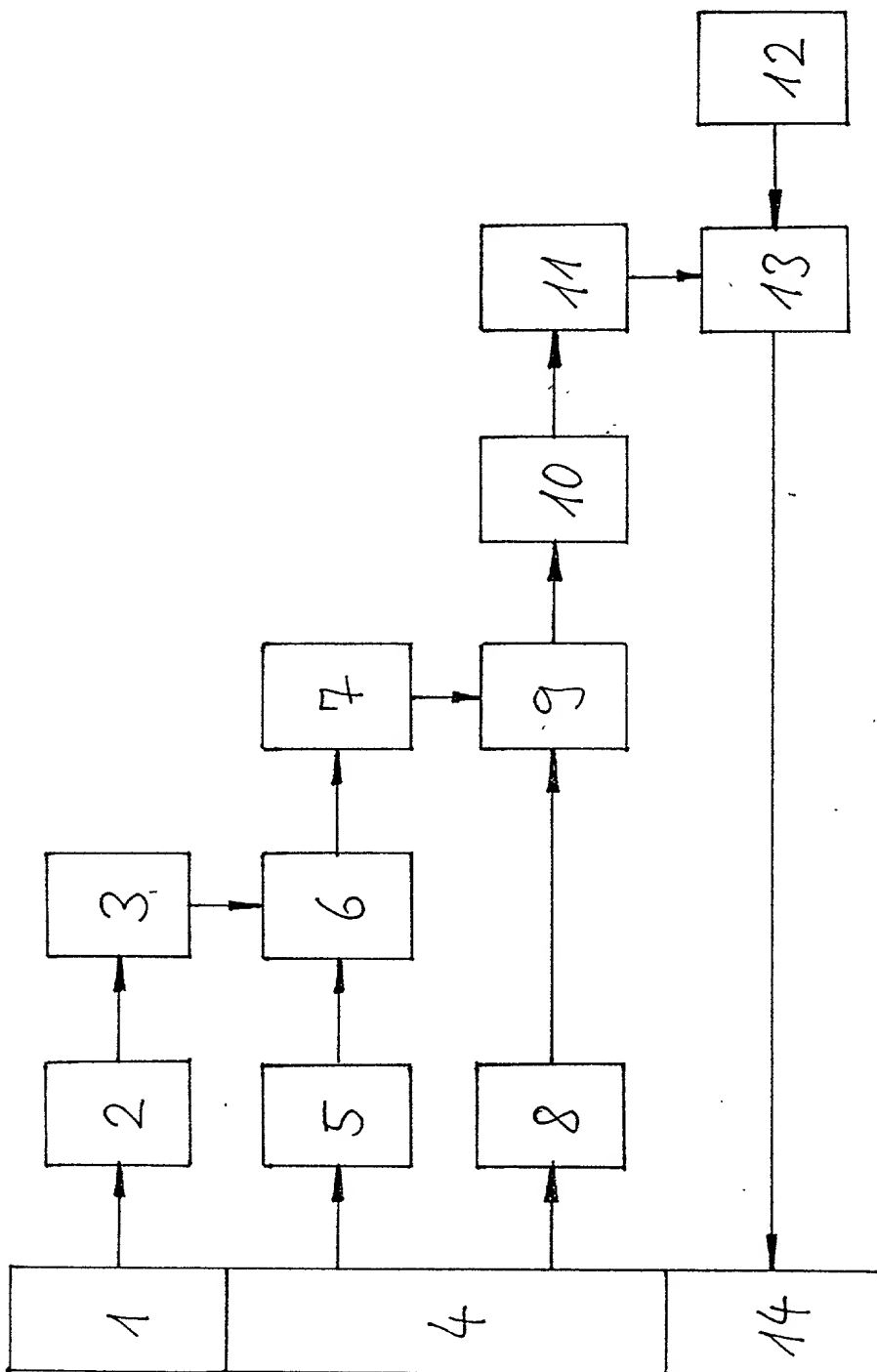


Fig. 4



Docket No.  
960160

## Declaration and Power of Attorney For Patent Application

### English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**Method of Determining the Receptivity of Wireless Signals in a Broadcast System**

the specification of which

(check one)

☐ is attached hereto.

☒ was filed on 19 July 1996 as United States Application No. or PCT International Application Number 08/676,355 and was amended on \_\_\_\_\_

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

<u>P 44 01 460.0</u>	<u>Germany</u>	<u>19 January 1994</u>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	
<u>                    </u>	<u>                    </u>	<u>                    </u>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	
<u>                    </u>	<u>                    </u>	<u>                    </u>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

N/A	
(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112. I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

PCT/DE95/00055	16/1/1995	pending
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

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Citizenship	
Post Office Address	

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Sixth inventor's signature	Date
Residence	
Citizenship	
Post Office Address	